

Gravatt, Dan

From: Gish, Erika <erika.gish@testamericainc.com>
Sent: Friday, August 16, 2013 12:16 PM
To: Ms. Emily Fisher; Gravatt, Dan
Subject: Files from 160-3053-1 West Lake Landfill - Report
Attachments: J3053-1 UDS Level 2 Report Final Report.pdf

Good Afternoon,
Attached is the report for Job 160-3053.
Regards,

Please let us know if we met your expectations by rating the service you received from TestAmerica on this project by visiting our website at: [Project Feedback](#)

ERIKA K GISH

TestAmerica St. Louis
THE LEADER IN ENVIRONMENTAL TESTING

Tel: 314.298.8566
www.testamericainc.com

Reference: [008836]
Attachments: 1

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0001

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-3053-1
Client Project/Site: West Lake Landfill

For:
Tetra Tech EM Inc.
415 Oak Street
Kansas City, Missouri 64106

Attn: Ms. Emily Fisher



*Authorized for release by:
8/16/2013 12:01:36 PM*

Erika Gish, Project Manager I
erika.gish@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Job ID: 160-3053-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill

Report Number: 160-3053-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The sample was received on 7/19/2013 11:24 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 21.0° C.

RADIUM-226 (GFPC)

Sample 6163-19 (160-3053-1) was analyzed for Radium-226 (GFPC) in accordance with EPA Method 903.0. The samples were prepared on 07/23/2013 and analyzed on 08/14/2013.

No other difficulties were encountered during the Radium-226 (GFPC) analysis.

All other quality control parameters were within the acceptance limits.

RADIUM-228 (GFPC)

Sample 6163-19 (160-3053-1) was analyzed for Radium-228 (GFPC) in accordance with EPA 904. The samples were prepared on 07/23/2013 and analyzed on 08/07/2013.



Case Narrative

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Job ID: 160-3053-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

No difficulties were encountered during the Radium-228 analysis.

All quality control parameters were within the acceptance limits.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Sample 6163-19 (160-3053-1) was analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with DOE. The samples were prepared on 07/30/2013 and analyzed on 08/01/2013.

No other difficulties were encountered during the Isotopic Thorium analysis.

All other quality control parameters were within the acceptance limits.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Sample 6163-19 (160-3053-1) was analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were prepared on 07/30/2013 and analyzed on 08/01/2013.

No difficulties were encountered during the Isotopic Uranium analysis.

All quality control parameters were within the acceptance limits.

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THE LEADER IN ENVIRONMENTAL TESTING

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8/16/2013

Login Sample Receipt Checklist

Client: Tetra Tech EM Inc.

Job Number: 160-3053-1

Login Number: 3053

List Source: TestAmerica St. Louis

List Number: 1

Creator: Clarke, Jill C

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ ($1/4''$).	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Definitions/Glossary

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-3053-1	6163-19	Water	07/18/13 17:18	07/19/13 11:24

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Client Sample Results

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Client Sample ID: 6163-19

Lab Sample ID: 160-3053-1

Date Collected: 07/18/13 17:18

Matrix: Water

Date Received: 07/19/13 11:24

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.197		0.0659	0.0682	1.00	0.0636	pCi/L	07/23/13 13:47	08/14/13 08:36	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110					07/23/13 13:47	08/14/13 08:36	1

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0724	U	0.208	0.208	1.00	0.356	pCi/L	07/23/13 13:55	08/07/13 10:38	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110					07/23/13 13:55	08/07/13 10:38	1
Y Carrier	87.9		40 - 110					07/23/13 13:55	08/07/13 10:38	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.186		0.304	0.305	1.00	0.177	pCi/L	07/30/13 07:32	08/01/13 15:53	1
Thorium-230	0.115	U	0.225	0.226	1.00	0.123	pCi/L	07/30/13 07:32	08/01/13 15:53	1
Thorium-232	0.0156	U	0.103	0.103	1.00	0.122	pCi/L	07/30/13 07:32	08/01/13 15:53	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	75.8		30 - 110					07/30/13 07:32	08/01/13 15:53	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	1.38		0.739	0.775	1.00	0.132	pCi/L	07/30/13 07:32	08/01/13 15:51	1
Uranium-235/236	0.000	U	0.0228	0.0228	1.00	0.0824	pCi/L	07/30/13 07:32	08/01/13 15:51	1
Uranium-238	0.890		0.595	0.613	1.00	0.132	pCi/L	07/30/13 07:32	08/01/13 15:51	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	76.5		30 - 110					07/30/13 07:32	08/01/13 15:51	1

TestAmerica St. Louis

QC Sample Results

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-62139/1-A
Matrix: Water
Analysis Batch: 66681

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62139

Analyte	MB MB		Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-226	0.09670		0.0513	0.0521	1.00	0.0616	pCi/L	07/23/13 13:47	08/14/13 08:36	1
Carrier	MB MB		Limits					Prepared	Analyzed	Dil Fac
	%Yield	Qualifier								
Ba Carrier	98.5		40 - 110					07/23/13 13:47	08/14/13 08:36	1

Lab Sample ID: LCS 160-62139/2-A
Matrix: Water
Analysis Batch: 66681

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 62139

Analyte	Spike Added	LCS LCS		Total	RL	MDC	Unit	%Rec.	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)					
Radium-226	11.2	11.12		1.09	1.00	0.0544	pCi/L	100	68 - 137
Carrier	LCS LCS		Limits						
	%Yield	Qualifier							
Ba Carrier	105		40 - 110						

Lab Sample ID: 160-3053-1 DU
Matrix: Water
Analysis Batch: 66681

Client Sample ID: 6163-19
Prep Type: Total/NA
Prep Batch: 62139

Analyte	Sample Sample		DU DU		Total	RL	MDC	Unit	RER	RER Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					
Radium-226	0.197		0.2663		0.0760	1.00	0.0540	pCi/L	0.48	1
Carrier	DU DU		Limits							
	%Yield	Qualifier								
Ba Carrier	104		40 - 110							

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-62142/1-A
Matrix: Water
Analysis Batch: 65378

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 62142

Analyte	MB MB		Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-228	0.04673	U	0.178	0.178	1.00	0.310	pCi/L	07/23/13 13:55	08/07/13 10:38	1
Carrier	MB MB		Limits					Prepared	Analyzed	Dil Fac
	%Yield	Qualifier								
Ba Carrier	98.5		40 - 110					07/23/13 13:55	08/07/13 10:38	1
Y Carrier	88.6		40 - 110					07/23/13 13:55	08/07/13 10:38	1

TestAmerica St. Louis

QC Sample Results

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Method: 904.0 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-62142/2-A

Matrix: Water

Analysis Batch: 65378

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 62142

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	Limits
Radium-228	4.23	3.603		0.508	1.00	0.294	pCi/L	85	56 - 140
LCS LCS									
Carrier	%Yield	Qualifier	Limits						
Ba Carrier	105		40 - 110						
Y Carrier	89.0		40 - 110						

Lab Sample ID: 160-3053-1 DU

Matrix: Water

Analysis Batch: 65378

Client Sample ID: 6163-19

Prep Type: Total/NA

Prep Batch: 62142

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	Limit
Radium-228	0.0724	U	0.4371		0.201	1.00	0.278	pCi/L	0.89	1
DU DU										
Carrier	%Yield	Qualifier	Limits							
Ba Carrier	104		40 - 110							
Y Carrier	91.2		40 - 110							

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-63504/1-A

Matrix: Water

Analysis Batch: 64487

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 63504

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.03472	U	0.148	0.148	1.00	0.140	pCi/L	07/30/13 07:32	08/01/13 15:53	1
Thorium-230	0.07849	U	0.165	0.166	1.00	0.0877	pCi/L	07/30/13 07:32	08/01/13 15:53	1
Thorium-232	0.0000	U	0.0154	0.0154	1.00	0.0554	pCi/L	07/30/13 07:32	08/01/13 15:53	1
MB MB										
Tracer	%Yield	Qualifier	Limits							
Thorium-229	88.5		30 - 110							
								Prepared	Analyzed	Dil Fac
								07/30/13 07:32	08/01/13 15:53	1

Lab Sample ID: LCS 160-63504/2-A

Matrix: Water

Analysis Batch: 64488

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 63504

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	Limits
Thorium-230	8.64	8.862		2.32	1.00	0.121	pCi/L	103	81 - 125
LCS LCS									
Tracer	%Yield	Qualifier	Limits						
Thorium-229	84.8		30 - 110						

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QC Sample Results

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: 160-3053-1 DU
Matrix: Water
Analysis Batch: 64490

Client Sample ID: 6163-19
Prep Type: Total/NA
Prep Batch: 63504

Analyte	Sample		DU		Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER	
	Result	Qual	Result	Qual						Limit	Limit
Thorium-228	0.186		0.03722	U	0.161	1.00	0.152	pCi/L	0.32		1
Thorium-230	0.115	U	0.1706		0.272	1.00	0.152	pCi/L	0.11		1
Thorium-232	0.0156	U	-0.01854	U	0.0353	1.00	0.133	pCi/L	0.25		1
DU DU											
Tracer	%Yield	Qualifier	Limits								
Thorium-229	85.7		30 - 110								

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-63505/1-A
Matrix: Water
Analysis Batch: 64457

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 63505

Analyte	MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Uranium-233/234	0.03118	U	0.151	0.151	1.00	0.148	pCi/L	07/30/13 07:32	08/01/13 15:51	1
Uranium-235/236	0.006466	U	0.110	0.110	1.00	0.150	pCi/L	07/30/13 07:32	08/01/13 15:51	1
Uranium-238	-0.002593	U	0.0913	0.0913	1.00	0.135	pCi/L	07/30/13 07:32	08/01/13 15:51	1
MB MB										
Tracer	%Yield	Qualifier	Limits		Prepared		Analyzed		Dil Fac	
Uranium-232	88.9		30 - 110		07/30/13 07:32		08/01/13 15:51		1	

Lab Sample ID: LCS 160-63505/2-A
Matrix: Water
Analysis Batch: 64466

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 63505

Analyte	Spike Added	LCS		Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec.	%Rec. Limits	
		Result	Qual							
Uranium-233/234	12.7	12.20		2.95	1.00	0.142	pCi/L	96	84 - 120	
Uranium-238	13.0	12.76		3.05	1.00	0.133	pCi/L	98	83 - 121	
LCS LCS										
Tracer	%Yield	Qualifier	Limits							
Uranium-232	82.5		30 - 110							

Lab Sample ID: 160-3053-1 DU
Matrix: Water
Analysis Batch: 64486

Client Sample ID: 6163-19
Prep Type: Total/NA
Prep Batch: 63505

Analyte	Sample		DU		Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER	
	Result	Qual	Result	Qual						Limit	Limit
Uranium-233/234	1.38		1.259		0.726	1.00	0.180	pCi/L	0.08		1
Uranium-235/236	0.000	U	0.1372		0.257	1.00	0.121	pCi/L	0.49		1
Uranium-238	0.890		1.008		0.638	1.00	0.141	pCi/L	0.09		1

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QC Sample Results

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Lab Sample ID: 160-3053-1 DU

Matrix: Water

Analysis Batch: 64486

Client Sample ID: 6163-19

Prep Type: Total/NA

Prep Batch: 63505

Tracer	DU DU		Limits
	%Yield	Qualifier	
Uranium-232	81.8		30 - 110

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QC Association Summary

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Rad

Prep Batch: 62139

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-3053-1	6163-19	Total/NA	Water	PrecSep-21	
160-3053-1 DU	6163-19	Total/NA	Water	PrecSep-21	
LCS 160-62139/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
MB 160-62139/1-A	Method Blank	Total/NA	Water	PrecSep-21	

Prep Batch: 62142

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-3053-1	6163-19	Total/NA	Water	PrecSep_0	
160-3053-1 DU	6163-19	Total/NA	Water	PrecSep_0	
LCS 160-62142/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
MB 160-62142/1-A	Method Blank	Total/NA	Water	PrecSep_0	

Prep Batch: 63504

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-3053-1	6163-19	Total/NA	Water	ExtChrom	
160-3053-1 DU	6163-19	Total/NA	Water	ExtChrom	
LCS 160-63504/2-A	Lab Control Sample	Total/NA	Water	ExtChrom	
MB 160-63504/1-A	Method Blank	Total/NA	Water	ExtChrom	

Prep Batch: 63505

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-3053-1	6163-19	Total/NA	Water	ExtChrom	
160-3053-1 DU	6163-19	Total/NA	Water	ExtChrom	
LCS 160-63505/2-A	Lab Control Sample	Total/NA	Water	ExtChrom	
MB 160-63505/1-A	Method Blank	Total/NA	Water	ExtChrom	

Tracer/Carrier Summary

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-3053-1

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)					
Lab Sample ID	Client Sample ID	Ba (40-110)					
160-3053-1	6163-19	104					
160-3053-1 DU	6163-19	104					
LCS 160-62139/2-A	Lab Control Sample	105					
MB 160-62139/1-A	Method Blank	98.5					
Tracer/Carrier Legend							
Ba = Ba Carrier							

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)					
Lab Sample ID	Client Sample ID	Ba (40-110)	Y (40-110)				
160-3053-1	6163-19	104	87.9				
160-3053-1 DU	6163-19	104	91.2				
LCS 160-62142/2-A	Lab Control Sample	105	89.0				
MB 160-62142/1-A	Method Blank	98.5	88.6				
Tracer/Carrier Legend							
Ba = Ba Carrier							
Y = Y Carrier							

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Water

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)					
Lab Sample ID	Client Sample ID	Th-229 (30-110)					
160-3053-1	6163-19	75.8					
160-3053-1 DU	6163-19	85.7					
LCS 160-63504/2-A	Lab Control Sample	84.8					
MB 160-63504/1-A	Method Blank	88.5					
Tracer/Carrier Legend							
Th-229 = Thorium-229							

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Water

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)					
Lab Sample ID	Client Sample ID	U-232 (30-110)					
160-3053-1	6163-19	76.5					
160-3053-1 DU	6163-19	81.8					
LCS 160-63505/2-A	Lab Control Sample	82.5					
MB 160-63505/1-A	Method Blank	88.9					
Tracer/Carrier Legend							
U-232 = Uranium-232							

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